BUILDING & APARTMENT MAINTENANCE

Program of Studies
2015-2016

Office of Career and Technical Education
Kentucky Department of Education

Building and Apartment Maintenance

Course Title	Post-Secondary Connection	Valid Course Code	Recommended Grade Level				Recommended Credit
			9	10	11	12	
Basic Blocklaying		460110		X	X	X	1
Basic Bricklaying		460109		X	X	X	1
Basic Blueprint Reading	BRX 120	499920	X	X	X	X	.5
Basic Troubleshooting		499925	X	X	X	X	1
Cooling and Dehumidification	ACR 250/251	460824	X	X	X	X	1
Co-op (Masonry)	MSY 199	460180			X	X	1
Electrical Components	ACR 130/131	460826	X	X	X	X	1
Heat Pump Application	ACR 270/271	460801		X	X	X	1
Heating and Humidification	ACR 260/261	460820		X	X	X	1
HVAC Electricity	ACR 102/103	460817	X	X	X	X	1
Industrial Safety	ISX 100	499930	X	X	X	X	.5
Intermediate Masonry	MSY 115	460116		X	X	X	1
Internship (Masonry)	MSY 198	460183			X	X	1
Introduction to Building & Apartment Maintenance	BAM 100	460241	X	X	X	X	1
Introductory Masonry	MSY 105	460112	X	X	X	X	1
Refrigeration Fundamentals	ACR 100/101	460828	X	X	X	X	1
Residential Energy Auditor Prep		460804		X	X	X	1
Residential HVAC Maintenance		460818		X	X	X	1
Residential Interior Maintenance	BAM 120	460222		X	X	X	1
Residential Maintenance Carpentry	BAM 110	460220		X	X	X	1
Residential Maintenance Masonry		460114		X	X	X	1
Residential Maintenance Plumbing		460516		X	X	X	1
Residential Maintenance Wiring	BAM 140	460333		X	X	X	1
Sheet Metal Fabrication	ACR 112/113	460847		X	X	X	1

BUILDING & APARTMENT MAINTENANCE

Program Description

The Construction Technology programs will prepare students for work in new construction, remodel, and energy auditing industries. Course offerings include everything from entry level trades courses, all the way to national certification. Students will train at the career centers, high schools and at real jobsites. Current and traditional building practices are included, while updated and advanced framing techniques, energy efficiency, health and safety, and sustainability methods are emphasized.

Construction Pre-Apprenticeship courses are included that focus on new construction, carpentry, and other building trades. Students learn about the tools and techniques used in the construction industries. The students may gain skills in Air Conditioning Technology, Building and Apartment Maintenance, Carpentry, Electrical Technology, Masonry and Plumbing. They are also introduced to green building methods and materials. The Building Performance and Energy Assessment courses shift that focus to analyzing existing homes.

Weatherization, Building Performance and Energy Assessment industries are helping families reduce their energy burden, while maintaining comfort and safety. Our students will learn the national standard and protocols for energy auditing, combustion appliance safety, and energy modeling. Successful students are prepared to take the national certification exams for building analysts and energy auditors.

Course offerings are intended to promote career ladders for those just entering the industry, as well as industry professionals looking to stay current. There are multiple certificates and degree options and inter-related disciplines at the Career Centers having articulation agreements with various postsecondary institutions.

SAMPLE CAREER PATHWAY- BUILDING & APARTMENT MAINTENANCE (BAM)

KENTUCKY CAREER PATHWAY/PROGRAM OF STUDY 2015-2016

COLLEGE/UNIVERSITY: College / State University
KCTCS Community College
HIGH SCHOOL (S): KY ATC/CTC/High School

CLUSTER: Construction
PATHWAY: Residential Maintenance Carpenter Assistant / Brick Layer Assistant
PROGRAM: Building & Apartment Maintenance (BAM)

	GRADE	ENGLISH	MATH	SCIENCE	SOCIAL STUDIES	REQUIRED COURSES / RECOMMENDED ELECTIVE COURSES / OTHER ELECTIVE COURSES / CAREER AND TECHNICAL EDUCATION COURSES			CREDENTIAL CERTIFICATE DIPLOMA DEGREE	SAMPLE OCCUPATIONS
SECONDARY	9	English I	Algebra I	Earth Space Science	World History	Health and PE	Technical Elective	BAM 100 Introduction to Building &		
	10	English II	Geometry	Biology I	World Civics	History and Appreciation of Fine Arts	BAM 110 Residential Maintenance	BAM 120 Residental Interior		
	11	English III	Algebra II	Physics or Chemistry	U.S. History	Foreign Language	BAM 140 Residential Maintenance	BAM 150 Residential HVAC	NCCER HVAC Level 1	Residential Maintenance Carpenter
	12	English IV	Math Elective	Computer Aided Drafting (elective)	World Geography	BAM 170 Residential Maintenance Masonry	CAR 298 Internship (BAM) 460232	CAR 199 Co-op 1 (BAM) 460229		Bricklayer Assistant - BAM
POSTSECONDARY	Year 13	ENG 101 Writing I	MT 110 Applied Mathematics	ASTR 104 Astronomy	College Chemistry	PSY 100 Intro Psychology	CAR 205 Introduction to Acoustical Carpentry	Occupation Safety	Refrigeration Mechanic	Industry Apprenticeship
	Year 14	ENG 200 Intro/Literature	Math 200	WLD 221 Certification Lab	HIS 109 US History	MSY 235 Special Techniques in Brick	Materials Science	PLB 298 Plumbing Practicum Repairs &	Associates Degree in Applied Science	Building & Apartment Foreman / Manager
	Year 15	ENG 200 Intro/Literature	MAT 250 CALCULUS	PHY 236 UNIV. PHYSICS I	CIV 102 WORLD CIV. II	PHY 195 METHODS OF ENG. PHYSICS	CIV 102 WORLD CIV. II	CAD 200 Intermediate Computer Aided design		
	Year 16	PHY 140 INTRO. COMPUTING APPS.	MAT 308 CALCULUS II	PHY 259 STATICS	MAT 309 CALCULUS III	MAT 411 DIFFERENTIALS EQTNS.	TECHNICAL ELECTIVE	PHY 330 DYNAMICS		
	Year 17	PHY 344 FLUID MECHANICS	PHY 370 INTRO. MODERN PHYSICS	CHE 201 GEN. COLLEGE CHEM. I	HUM 211 HUMANITIES	ITD 102 CAD APPLICATIONS	PHY 346 HEAT TRANSFER	PHY 375 MATERIALS SCIENCE	PHY 390 ENGR. MEASUREMENT	TECH.ELECTIVE
	Year 17	PHY 359 MECHANICS OF MATERIALS	PHY 470 OPTICS	PHY 498 SENIOR ENGR. DESIGN I	ECO 231 PRINC. OF MICROECONOMICS	PHY 499 SENIOR ENGR. DESIGN II	TECHNICAL ELECTIVE	MAT DEPTH ELECTIVE	FREE ELECTIVE	HUM/FA ELEC.
								BACHELORS DEGREE ENGINEERING	Western Kentucky UNIVERSITY	ENGINEER

Other Elective Courses
Career and Technical Education Courses
Credit-Based Transition Programs (e.g. Dual/Concurrent Enrollment, Articulated Courses, 2+2+2)
(◆=High School to Comm. College) (● =Com. College to 4-Yr Institution) (■ = Opportunity to test out)
Mandatory Assessments, Advising, and Additional Preparation
TECHNICAL COLLEGE CREDIT GIVEN THROUGH THE KCTCS DUAL ENROLLMENT PROGRAM
Certificate given through the Warren County Area Technology Center
Degree given through the Bowling Green Technical College KCTCS
DEGREE GIVEN THROUGH THE MURRAY STATE UNIVERSITY

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BUILDING AND APARTMENT MAINTENANCE CAREER PATHWAYS 2015-2016

RESIDENTIAL MAINTENANCE CARPENTER ASSISTANT CIP 46.0401.01

PATHWAY DESCRIPTION: A program that prepares individuals to apply technical knowledge and skills to keep a building functioning, and to service a variety of structures including commercial and industrial buildings and mobile homes. Includes instruction in the basic maintenance and repair skills required to service building systems, such as air conditioning, heating, plumbing, electrical, major appliances, and other mechanical systems.

BEST PRACTICE CORE	**EXAMPLE ILP-RELATED CAREER TITLES**
Foundational Skills Necessary for Career-Ready Measure: (KOSSA/Industry Certification) *Complete **(2) TWO CREDITS:*** • 460241 Introduction to Building & Apartment Maintenance • 460220 Residential Maintenance Carpentry *Choose **(2) TWO CREDITS** from the following:* • 460818 Residential HVAC Maintenance • 460222 Residential Interior Maintenance • 460114 Residential Maintenance Masonry • 460333 Residential Maintenance Wiring • 460513 Residential Maintenance Plumbing • 460229 Co-op I (BAM) OR 460232 Internship (BAM)	Bricklayer/Stonemason Concrete Mason Construction Laborer Construction Manager Construction Tradesperson Property Manager

BUILDING AND APARTMENT MAINTENANCE
CAREER PATHWAYS
2015-2016

BRICKLAYER ASSISTANT - BAM
CIP 46.0101.01

PATHWAY DESCRIPTION: A program that prepares individuals to apply technical knowledge and skills to keep a building functioning, and to service a variety of structures including commercial and industrial buildings and mobile homes. Includes instruction in the basic maintenance and repair skills required to service building systems, such as air conditioning, heating, plumbing, electrical, major appliances, and other mechanical systems.

BEST PRACTICE CORE	**EXAMPLE ILP-RELATED CAREER TITLES**
Foundational Skills Necessary for Career-Ready Measure: (KOSSA/Industry Certification) *Complete **(4) FOUR CREDITS:*** • 460112 Introductory Masonry • 460116 Intermediate Masonry • 460223 Residential Maintenance Masonry • 499930 Industrial Safety* AND 499920 Basic Blueprint Reading* • 460229 Co-op I (BAM) OR 460232 Internship (BAM) Note: (*) Indicates half-credit course	Bricklayer/Stonemason Concrete Mason Construction Laborer Construction Manager Construction Tradesperson Property Manager

BUILDING AND APARTMENT MAINTENANCE
CAREER PATHWAYS
2015-2016

ENVIRONMENTAL CONTROL SYSTEM SERVICER ASSISTANT
CIP 47.0201.05

PATHWAY DESCRIPTION: A program that prepares individuals to apply technical knowledge and skills to keep a building functioning, and to service a variety of structures including commercial and industrial buildings and mobile homes. Includes instruction in the basic maintenance and repair skills required to service building systems, such as air conditioning, heating, plumbing, electrical, major appliances, and other mechanical systems.

BEST PRACTICE CORE	**EXAMPLE ILP-RELATED CAREER TITLES**
Foundational Skills Necessary for Career-Ready Measure: (KOSSA/Industry Certification) *Complete **(1) ONE CREDIT:*** • 460828 Refrigeration Fundamentals *Choose **(3) THREE CREDITS** from the following:* • 460817 HVAC Electricity • 470215 Electrical Components • 460824 Cooling and Dehumidification • 460801 Heat Pump Application • 460820 Heating and Humidification • 460229 Co-op I (BAM) OR 460232 Internship (BAM)	Construction Laborer Construction Manager Construction Tradesperson Environmental Engineer Solar Energy Tech Home Inspector Energy Auditor

COMPLIMENTARY OR ADVANCED COURSEWORK BEYOND BUILDING & APARTMENT MAINTENANCE (BAM) PATHWAY(s)
Upon completion of a pathway, additional coursework to enhance student learning is encouraged. Credits earned in Advanced or Complimentary Coursework "Beyond the Pathway" may not be substituted for pathway courses in order to achieve Preparatory or Completer status.
499920 Basic Blueprint Reading
499925 Basic Troubleshooting
499930 Industrial Safety *(.5 credit)*
460804 Residential Energy Auditor Prep
460847 Sheet Metal Fabrication
Career Options
JAG Courses

Basic Blocklaying

460110

Course Description
Demonstrate the proper and safe use of masonry tools and the various types of mortar and cement while laying block on the job site. The students will perform the skills used in blocklaying procedures; mixing mortar, use of the trowel, spreading mortar, making head/bed joints, laying masonry units. Demonstrate the different methods of spacing materials, the 6-8-10 method, use of the transit level, block spacing, on laying straight, plumb block to the line, and the use of a modular rule. This course will also include 10 hours of safety training required to receive the OSHA 10 card.

Content/Process		
1	**Basic Blocklaying:** a) Practice a safe work environment according to best practices in the masonry industry. b) Determining coursing using a modular rule. c) Proportion and mix mortars manually with a hoe and mortar box. d) Stock a mortar board or pan. e) Temper mortar. f) Chalk a line. g) Lay block to a line while holding bond. h) Layout building lines using the Pythagorean therum (6-8-10). i) Layout block corners and walls with tape measure. j) Square corners with a 2' framing square. k) Spread mortar for block. l) Butter head joints for block. m) Lay closure block. n) Plumb and level with mason's 2' and 4'levels. o) Finish block using a convex jointer.	

Connections:
*Common Core State Standards
*KOSSA
*Common Core Technical Standards
*New Generation Science Standards
CTSO's – Skills USA

Basic Bricklaying

460109

Course Description		
Demonstrate the proper and safe use of masonry tools and the various types of mortar and cement while laying block on the job site. The students will perform the skills used in bricklaying procedures; mixing mortar, use of the trowel, spreading mortar, making head/bed joints, laying masonry units. Demonstrate the different methods of spacing materials, the 6-8-10 method, use of the transit level, brick spacing, on laying straight, plumb brick to the line, and the use of a modular rule. This course will also include 10 hours of safety training required to receive the OSHA 10 card.		
Content/Process		
1	**Basic Bricklaying:** a) Demonstrate a safe work environment according to best practices in the masonry industry and OSHA standards. b) Determine coutsing using a modular/brick spacing rule. c) Carry brick with tongs. d) Dry bond brick. e) Proportion and mix mortars manually with a hoe and mortar box. f) Stock a mortar board or pan. g) Temper mortar. h) Spread mortar for brick. i) Butter head joints for brick. j) Lay brick to a line while holding bond. k) Lay closure brick. l) Chalk a line. m) Layout building lines using Pythagorean therum (6-8-10). n) Square corners with a 2' framing square. o) Finish joints with a variety of masonry tools. p) Plumb and level with mason's 2' and 4' levels.	
Connections: *Common Core State Standards *KOSSA *Common Core Technical Standards *New Generation Science Standards CTSO's – Skills USA		

Basic Blueprint Reading

499920

Course Description		
This course presents basic applied math, lines, multiview drawings, symbols, various schematics and diagrams, dimensioning techniques, sectional views, auxiliary views, threads and fasteners, and sketching typical to all shop drawings. Safety will be emphasized as an integral part of the course		
Content/Process		
1	**Basic Blueprint Reading:** a) Introduction and math review (fractions and decimals) b) Identify the alphabet of lines c) Identify multiple views d) Arrange multiple views e) Arrange two-view drawings f) Identify one-view drawings g) Arrange and identify auxiliary views h) Demonstrate the use of size and location dimensions i) Demonstrate proper dimensions of cylinders and arcs j) Size dimensions of holes and angles k) Locate dimensions for centering of holes, points, and centers l) Interpret the base line dimensions on drawings m) Identify half, full, and removed sections n) Identify electrical schematic and diagram symbols o) Identify welding symbols and equipment p) Interpret ordinate and tabular dimensions q) Set tolerances using geometric dimensioning techniques r) Sketch parts with irregular shapes s) Sketch oblique views of various parts t) Sketch and dimension shop drawings u) Dimension parts using shop notes v) Calculate tolerances w) Identify labeling of various screw threads x) Calculate tapers and machined surfaces y) Interpret connections and flow of various electrical, hydraulic, and pneumatic schematics and diagrams	
Connections: *Secretary's Commission on Achieving Necessary Skills (SCANS) *National Center for Construction Education Research (NCCER) *21st Century Skills *Common Core State Standards ELA and Math *Interdisciplinary Course		

Basic Troubleshooting

499925

Course Description		
This course explores the science of troubleshooting and the importance of proper maintenance procedures; how to work well with others, aids in communication, and trade responsibilities; examines actual troubleshooting techniques, aids in troubleshooting, and how to use schematics and symbols; focuses on specific maintenance tasks such as solving mechanical and electrical problems, breakdown maintenance, and the hows and whys of planned maintenance.		
Content/Process		
1	**Basic Troubleshooting:** a) Explain the reason efficient troubleshooting is important in a production plant b) List the steps in troubleshooting a machine/system c) Demonstrate good communication skills when dealing with plant personnel d) List the questions that should be asked when a machine/system fails e) List the signs of a machine in need of service f) List the information that should be recorded in a machine equipment record g) Identify calibration standards h) Identify different troubleshooting test equipment i) Use schematics when troubleshooting j) Identify differences in schematics when troubleshooting k) Use a troubleshooting chart l) Identify bearing wear problems m) Identify pump failure problems and solutions n) Identify types of hosing o) Identify current voltage characteristics of wire p) Apply all safety rules when working with electrical equipment q) Identify a pictorial diagram, a blocking diagram, and a schematic diagram r) Demonstrate how to troubleshoot an electrical problem s) List preventive maintenance procedures	
Connections: *Common Core State Standards *KOSSA *Common Core Technical Standards *New Generation Science Standards CTSO's – Skills USA		

Cooling and Dehumidification

460824

Course Description		
Explains the working characteristics of air conditioning units with air and water cooled condensers. Line, low voltage and pneumatic controls will also be covered. ARI - Air Conditioning Systems: Subtopics A-E; System Installation and Start-Up: Subtopic D; System Servicing and Troubleshooting: Subtopic D; Controls: Subtopic		
Content/Process		
	Safety: a) Practice/observe safety procedures/techniques b) Explain the importance of manufacturers' installation and operation requirements c) Check system operation while following all safety procedures d) Follow local codes and ordinances during installation and repair e) Demonstrate the use of tools and test equipment while following safety practices	
	Air-Conditioning: a) Describe "air conditioning" b) List the benefits of "conditioned" air c) Describe some of today's current issues regarding air conditioning - industry concerns and future ramifications d) Describe the difference between "split systems" and "package systems" e) Describe the sequence of the basic refrigeration cycle and operation of the air conditioning system f) Use and read various tools and instrumentation needed for checking, testing, and operating air conditioning systems g) Analyze air conditioning systems and appropriately diagnose the electrical and/or mechanical problems	
	Cooling and Dehumidification: a) Define the types of condensers: air cooled, water cooled, evaporative b) Adjust the air flow for proper temperature difference c) Describe maintenance of a condenser and a cooling tower d) Demonstrate good customer relations in a classroom simulation e) Determine equipment electrical requirements f) Verify equipment air flow and distribution requirements g) Check operation of all electrical components including control components h) Demonstrate the use of tools and test equipment i) Read and demonstrate understanding of electrical wiring diagrams j) Develop a systematic way to diagnose system problems and	

	demonstrate in class k) Determine the cause of failure in a system l) Identify and describe possible causes of failure and how to eliminate m) Verify system operation n) Write a service report o) Identify types of control systems: electromechanical, pneumatic, electronic, and programmable p) Identify control system components q) Describe the sequences of operation in all types of control systems r) Construct a schematic diagram using all components necessary to safely operate an air conditioner s) Program a programmable thermostat for heating, cooling, and heat pump operation including set up and set back t) Plot and chart psychrometric terms.	

Connections:
*Common Core State Standards
*Kentucky Occupational Skills Standards Assessment
*Common Core Technical Standards
*New Generation Science Standards
*Post-Secondary KCTCS ACR280
*CTSO's—Skills USA

Co-op (Masonry)

460180

Course Description		
Cooperative Education provides supervised on-the-job work experience related to the student's educational objectives. Students participating in the Cooperative Education program receive compensation for their work.		
Prerequisites: Consent of Instructor		
Content/Process		
1	**Co-op:** a) Gain career awareness and the opportunity to test career choice(s) b) Receive work experience related to career interests prior to graduation c) Integrate classroom studies with work experience d) Receive exposure to facilities and equipment unavailable in a classroom setting e) Increase employability potential after graduation f) Earn funds to help finance education expenses	
Connections *Secretary's Commission on Achieving Necessary Skills (SCANS) *National Center for Construction Education Research (NCCER) *21st Century Skills *Common Core State Standards ELA and Math *Interdisciplinary Course		

Electrical Components

460826

Course Description		
This course defines the electrical components of an air conditioning system. Different types of line voltages, wiring diagrams, and solid-state devices are included. Safety is emphasized.		
TASK LIST		
1	**Electrical Components:** a) Practice/observe safety procedures/techniques b) Measure voltage with digital and analog voltmeters c) Measure AC current with a clamp-on ammeter d) Check winding insulation with a megohmmeter e) Define watts, ohms, volts, amps f) Define and compare single and multi-phase voltage and current g) Demonstrate proper use of ohmmeter, ammeter, and voltmeter. (Voltage, Ohms, Capacitance, & Micro Amps h) Calculate electrical circuit loads i) Use appropriate meters to check fuses and breakers j) Interpret tables and charts from National Electrical Code (NEC) k) Figure wire sizes and voltage drop l) Draw and identify power transformer types m) Size and test fuses and breakers and safely replace them n) Use NEC tables to size Conduit o) Define relays, sequencers, contactors, capacitors, defrost timers, crankcase heaters, water valves, damper actuators, thermostats, controllers, rheostats, zone valves, solenoids p) Explain the operation and application of: split phase motors, three phase motors, variable speed motors, shaded pole motors, and permanent split capacitor motors q) Demonstrate proper use of testing equipment for motors r) Interpret detailed instructions for wiring circuits s) Draw electrical circuits in accordance with standard wiring procedures t) Wire actual electrical circuits from wiring diagrams u) Explain the use of various electrical components in HVACR v) Interpret schematic wiring diagrams into a sequence of operation for HVACR equipment w) Rewire a HVACR unit using a schematic diagram x) Develop an approved routine for electrical troubleshooting	
Connections: Common Core State Standards KOSSA Common Core Technical Standards New Generation Science Standards		

CTSO's--Skills

Heat Pump Application

460801

Course Description		
Explains reverse cycle heating systems, defrost cycles, reversing valves, and auxiliary heating. This course will also concentrate on the line and control voltage circuitry pertaining to these units. ARI Controls: Subtopic E; Heat Pump Systems: Subtopics A and B; System Installation and Start-Up: Subtopic C; System Servicing and Troubleshooting: Subtopic E		
Content/Process		
1	**Heat Pump Application:** a) Practice/observe safety procedures/techniques b) Explain the basic theory of heat pump operation c) Compare heat pump systems based on performance rating information: COP, SEER, balance points, economics d) Analyze and explain the refrigerant cycle in both heating and cooling modes e) Identify and describe different types of heat pump systems: air to air, water to air, water to water, air to water, air to ground, open loop, and closed loop f) Analyze and compare the operation and performance of the different types of heat pump systems g) Explain the operation and function of a reversing valve h) Identify the main types of defrost controls i) Explain the operation of each type of defrost control j) Describe the purpose and function of outdoor thermostats k) Describe the sequence and purpose of emergency heat controls l) Describe the purpose and function of Metering devices m) Install or replace a heat-sequencing relay n) Identify and explain the operation and function of the electrical and mechanical components of the heat pump o) Explain the importance of manufacturers' installation and operation requirements p) Determine equipment electrical requirements q) Verify equipment air flow and distribution r) Check operation of all electrical components including control components s) Check system operation in the heating and cooling modes while following safety procedures t) Follow local codes and ordinances during installation and repair u) Read and demonstrate an understanding of electrical wiring diagrams v) Develop systematic way to diagnose system problems and demonstrate method in class w) Identify and describe all possible causes of failure and how to	

	eliminate causes x) Use appropriate tools and test equipment while following safety practices y) Verify system operation	

Connections:
*Secretary's Commission on Achieving Necessary Skills (SCANS)
*National Center for Construction Education Research (NCCER)
*21st Century Skills
*Common Core State Standards ELA and Math
*Interdisciplinary Course

Heating and Humidification

460820

Course Description		
Explains heating systems from simple fossil fuel furnaces through more complex systems. This course will also concentrate on the line and control voltage circuitry pertaining to these systems. ARI Controls: Subtopics A-C; Heating Systems: Subtopics A-C; System Installation and Start-Up: Subtopics A and B; System Servicing and Troubleshooting: Subtopic C; Tools and Equipment: Subtopic D		
Content/Process		
1	**Safety:** a) Practice/observe safety procedures/techniques b) Perform safety lockout procedures for burners c) Test a fan/limit control to identify a set point of control d) Test all safety controls e) Check ignition systems while following all safety principles f) Use tools and test equipment appropriately while following safety practice	
2	**Valves:** a) Adjust valves b) Check coil resistance of a valve coil c) Test gas valve operation d) Check the voltage at gas valve operator e) Explain direct vs. servo regulation f) Check pressure at inlet vs. outlet of gas valve g) Explain the operation of a solenoid valve h) Identify limited, non-adjustable and adjustable regulators i) Determine application of gas valves j) Explain the operation of an oil delay valve k) Check water-regulating valve operator l) Inspect/change zone valve operator m) Discuss TXV valves and their operation	
3	**Pilot Devices:** a) Differentiate between pilot proving devices b) Explain the operation of flame rod, mercury flame switch, bimetal, and millivolt flame sensors c) Test and change a thermocouple flame sensor d) Clean the pilot assembly	
4	**Thermostats:**	

	a) Identify and install residential heating and cooling thermostats b) Check and adjust the heat anticipator c) Set aquastat	
5	**Furnace Gas Systems:** a) Perform a regular conversion on a gas valve from natural gas to LP or reverse: low, line voltage, redundant, two-stage, and modulating b) Test and adjust the fuel system of furnace c) Measure gas pressure with a U-tube manometer d) Adjust burner system to recommended efficiency e) Perform pressure checks on the venting system f) Adjust the regulator g) Measure temperature difference across heating and cooling equipment h) Verify equipment air flow and distribution requirements i) Check operation of gas train components and measurements j) Check for correct heating input and adjust to manufacturers' specifications k) Demonstrate an understanding of combustion theory l) Determine combustion air requirements m) Verify system operation	
6	**Heating** a) Test spark ignition modules b) Wire a complete heating system - line and low voltage c) Identify controls for heating and cooling d) Check the ignition system e) De-rate or change over a gas burner f) Check for proper temperature rise across the furnace g) Set proper air distribution in house h) Remove, install, and adjust blower motor and/or belt i) Adjust individual register outlets to properly balance system j) Demonstrate good customer relations in a classroom simulation k) Explain the importance of manufacturers' installation and operation requirements l) Determine equipment electrical requirements m) Check operation of all electrical control components n) Demonstrate use of tools and instruments o) Test for proper combustion p) Check electrical components for operation and wiring connections q) Read electrical wiring diagrams and demonstrate an understanding of wiring diagrams r) Develop a systematic way to diagnose system problems and demonstrate in class s) Determine cause of failure in a heating system t) Identify and describe all possible causes of failure and how to	

	eliminate causes u) Write a service report	
7	**Cooling & Heat pump (Super-heat & Sub-Cooling)** a) Determine what type of Freon is in the system b) Hook up refrigeration manifold to system c) Start system and allow to settle reading on gauges d) Install line temperature measurement probes e) Read gauge pressure and saturation temperature f) Read line temperature from thermometer on high and low side g) Determine superheat (suction) and sub cooling (liquid) h) Demonstrate proper shut down i) Remove testing equipment properly j) Restart equipment and put in normal operation	
8	**Humidification** a) Wire a humidistat into electrical circuit b) Determine the relative humidity (using a sling psychrometer)	
9	**Fuel Oil:** a) Measure resistance of a cad cell during operation b) Check safety control for proper timed operation on shut down c) Check oil burner components and measurements d) Evaluate fuel supply systems e) Change Fuel oil filter f) Clean oil pump strainer g) Measure chimney draft with a draft gauge h) Determine the efficiency of an oil pump using a vacuum gauge and a pressure gauge i) Check for proper oil pressure at fuel pump j) Remove drawer assembly and change nozzle and adjust ignitors k) Change oil pump coupler l) Install delay fuel oil valve m) Perform an efficiency test on an oil-gas burner: smoke test, CO2 test, and 02 test n) Set Over the fire draft o) Set breech draft	
10	**Boilers:** a) Oil motor(s) and bearings b) Check circulator for alignment and lubrication c) Check system for any gasket leaks @ tankless and circulators d) Remove air from water system e) Wire a multizone / multipump hydronic system f) Identify types of hydronic piping systems g) Observe proper draft conditions h) Test boiler efficiency and clean if necessary	

	i) Set aqua stat	
11	**Codes** a) Describe the reasons for codes b) Discuss three model codes: Boca, standard, uniform c) Identify the codes and standards for the applicable area, locality, or state d) Discuss the relationship between codes and manufacturers' installation instructions e) Identify standards not covered by codes: ARI, ASHRAE, SMACNA	

Connections:
*Common Core State Standards
*Kentucky Occupational Skills Standards Assessment
*Common Core Technical Standards
*Post-Secondary KCTCS MTH100
*CTSO's—Skills USA

HVAC Electricity

460817

Course Description		
This course introduces students to the basic physics of electricity. Students apply Ohm's law; measure resistance, voltage, ohms, watts and amps; construct various types of electrical circuits; select wire and fuse sizes; and learn to troubleshoot an electric motor and motor controls.		
Content/Process		
1	**HVAC Electricity:** a) Practice electrical safety b) Measure ohms with an ohmmeter c) Measure voltage with a voltmeter d) Measure amps with an ammeter e) Measure watts with a wattmeter f) Solve electrical circuit problems using Ohm's Law g) Draw and interpret electrical symbols h) Construct series circuits i) Construct parallel circuits j) Connect, operate, and identify the types of single-phase motors k) Measure the resistance of windings in a split-phase motor and identify the start/run windings l) Test capacitors m) Select wire and fuse sizes n) Test transformers o) Locate faults in electrical circuits p) Identify types of 3-phase power supplies q) Troubleshoot magnetic motor starters and coils	
Connections: *Secretary's Commission on Achieving Necessary Skills (SCANS) *National Center for Construction Education Research (NCCER) *21st Century Skills *Common Core State Standards ELA and Math *Interdisciplinary Course		

Industrial Safety
499930

Course Description		
This course provides practical training in industrial safety. The students are taught to observe general safety rules and regulations, to apply work site and shop safety rules, and to apply OSHA regulations. Students are expected to obtain certification in first aid and cardiopulmonary resuscitation.		
Content/Process		
1	**Industrial Safety:** a) Apply work site and lab safety procedures b) Apply personal safety rules and procedures c) Apply fire prevention rules and procedures d) Obtain first aid certification e) Obtain CPR certification (Recommended but not required) f) Demonstrate hazardous communications procedures g) Describe and demonstrate universal precautions procedures h) Obtain OSHA 10 certification (recommended but not required)	
Connections: *Common Core State Standards *KOSSA *Common Core Technical Standards *New Generation Science Standards *Post-Secondary KCTCS ISX100 *CTSO's--SkillsUSA		

Intermediate Masonry

460116

Course Description		
Builds on proficiency in competencies learned in MASE 105. Focuses on laying straight and plumb brick to the line, emphasizing bricking gables and building columns. Laboratory.		
Content/Process		
1	**Intermediate Masonry:** a) Proportion and mix mortars manually with a hoe and mortar box b) Set up and maintain a mortar mixer c) Proportion and mix mortar with electric and gasoline powered mixers d) Set up and maintain masonry saws e) Stock a mortar board or pan f) Temper mortar g) Lay out building lines using the 6-8-10 method h) Determine coursing with a brick spacing rule and with a modular mason's rule i) Drop jack lines j) Set corner poles for veneer k) Plumb and level with a mason's two (2') and four (4') foot levels. l) Gauge-Plumb with a plumb bob m) Chalk a line n) Set lines, pins, block and trigs o) Inspect, assemble and disassemble rigging and scaffolding p) Carry brick with tongs q) Cut masonry materials with hand tools r) Cut materials with a masonry saw s) Identify brick types t) Spread mortar for brick u) Make head joints for brick v) Lay inside and outside brick corner leads w) Gauge masonry walls with a mason's modular rule x) Dry bond brick y) Bond a brick wall for range with a rule z) Lay brick to a line while holding bond aa) Tuck-point a wall bb) Finish joints with a variety of tools cc) Identify types of block dd) Lay out block corners and walls with a tape measure ee) Bond corners for all widths of block ff) Spread mortar for block gg) Lay inside and outside block corner leads	

	hh) Lay a block wall to a line ii) Lay closure block/brick jj) Bond corners for all widths of block kk) Install foundation vents ll) Top out veneer walls behind frieze boards mm) Brick a gable nn) Build brick columns	

Connections:
*Common Core State Standards
*KOSSA
*Common Core Technical Standards
*New Generation Science Standards
*Post-Secondary: KCTCS MASE 115
*CTSO's--SkillsUSA

Internship (Masonry)
460183

Course Description		
Internship provides supervised on-the-job work experience related to the student's educational objectives. Students participating in the internship do not receive compensation.		
Prerequisites: Consent of Instructor		
Content/Process		
1	**Internship (Masonry):** a) Gain career awareness and the opportunity to test career choice(s) b) Receive work experience related to career interests prior to graduation c) Integrate classroom studies with work experience d) Receive exposure to facilities and equipment unavailable in a classroom setting e) Increase employability potential after graduation	
Connections *Kentucky Occupational Skills Standards Assessment (KOSSA) *National Center for Construction Education Research (NCCER) *Common Core State Standards *21st Century Skills		

Introduction to Building & Apartment Maintenance

460241

Course Description		
This course covers required safety practices in the shop and workplace; identification and use of hand tools used in the construction trades; identification of construction materials; interpretation of blueprints and/or drawings; and exposure to various mechanical and structural systems in a residential structure.		
Content/Process		
1	**Safety:** a) Knowledge of safe shop practices and procedures b) Knowledge of fire safety equipment c) Knowledge of first aid procedures d) Safety with handling and positioning of ladders	
2	**Measuring Instruments:** a) Identify and understand how to use measuring instrument tools	
3	**Hand Tools:** a) Understand how to safely use hand tools b) Identify and understand how to properly use a hammer c) Identify and understand how to properly use screwdrivers d) Identify and understand how to properly use a sledge hammer e) Identify and understand how to properly use ripping bar and nail pullers f) Identify and understand how to properly use a wrench g) Identify and understand how to properly use a pliers and wire cutters h) Identify and understand how to properly use a level i) Identify and understand how to properly use a square j) Identify and understand how to properly use a bench vise k) Identify and understand how to properly use a clamp l) Identify and understand how to properly use a saw (hand) m) Identify and understand how to properly use a file and rasp n) Identify and understand how to properly use a chisel and punch o) Identify and understand how to properly use a plumb bob p) Identify and understand how to properly use a socket and ratchet q) Identify and understand how to properly use a torque wrench r) Identify and understand how to properly use a wedge s) Identify and understand how to properly use a chalk line t) Identify and understand how to properly use utility knife u) Identify and understand how to properly use a chain fall and come-along v) Identify and understand how to properly use a wire brush w) Identify and understand how to properly use a shovel x) Identify and understand how to maintain hand tools	

4	**Power Tools:** a) Understand how to safely use power tools b) Identify and understand how to properly use a power drill c) Identify and understand how to properly use a saw (circular) d) Identify and understand how to properly use a grinder and sander e) Identify and understand how to properly use miscellaneous power tools f) Identify and understand how to maintain power tools g) Identify and understand how to use stationary tools	
5	**Fastening & Anchoring Devices:** a) Identify and understand how to use fastening devices b) Identify and understand how to use anchoring devices	
6	**Construction:** a) Identify and understand basic framing components b) Identify and understand basic construction materials c) Identify and understand residential mechanical systems	
7	**Basic Blueprint:** a) Identify blueprints and drawings b) Sketch a drawing	
Connections: *Common Core State Standards *KOSSA *Common Core Technical Standards *New Generation Science Standards CTSO's – Skills USA		

Introductory Masonry

460112

Course Description		
Introduce various types of mortar and cement along with the use of basic masonry tools. Emphasizes the different methods of spacing materials on a construction site, the 6-8-10 method, and use of the transit level, brick spacing, and modular rule. Focusing on laying straight and plumb brick to the line, bricking gables and building columns. Permits application techniques for setting up different types of masonry materials, marking off layout lines, and erecting batter boards along with techniques employed in different types of weather and climates. Laboratory.		
Content/Process		
1	**Introductory Masonry:** a) Proportion and mix mortars manually with a hoe and mortar box b) Set up and maintain a mortar mixer c) Proportion and mix mortar with electric and gasoline powered mixers d) Setup and maintain masonry saws e) Stock a mortar board or pan f) Temper mortar g) Lay out building lines using the 6-8-10 method h) Square corners with a framing square i) Determine coursing with a brick spacing rule and with a modular mason's rule j) Determine coursing with a modular mason's rule k) Drop jack lines l) Set corner poles for veneer m) Set freestanding corner poles n) Plumb and level with a mason's two (2') and four (4') foot levels o) Plumb with a plumb bob p) Chalk a line q) Set lines, pins, blocks, and trigs r) Inspect, assemble, and disassemble rigging and scaffolding s) Carry brick with tongs t) Cut masonry materials with hand tools u) Cut materials with a masonry saw v) Identify brick types w) Spread mortar for brick x) Make head joints for brick y) Lay inside and outside brick corner leads z) Gauge masonry walls with a mason's modular rule aa) Dry bond brick bb) Bond a brick wall for range with a rule cc) Lay brick to a line while holding bond dd) Tuck-point a wall ee) Finish joints with a variety of tools	

	ff) Identify types of block gg) Lay out block corners and walls with a tape measure hh) Bond corners for all widths of block ii) Spread mortar for block jj) Lay inside and outside block corner leads kk) Lay a block wall to a line ll) Lay closure block/brick mm) Lay 4" partition block walls, and cap block nn) Install foundation vents	

Connections:
*Common Core State Standards
*KOSSA
*Common Core Technical Standards
*New Generation Science Standards
*Post-Secondary: KCTCS MASE 105
*CTSO's--SkillsUSA

Refrigeration Fundamentals

460828

Course Description		
Introduces the fundamentals of refrigeration, refrigeration terms, and the basic refrigeration cycle. Proper use of tools, test equipment, and materials is stressed. Environmental issues including refrigerant handling are discussed. Refrigerant piping and methods used to join them are taught. General and specific safety is emphasized.		
Content/Process		
1	**The Basic Refrigeration System:** a) Explain the history of refrigeration b) Identify and explain the operation of the four major components c) Identify the high and low sides of the system d) Explain the four parts of the refrigeration cycle e) Draw a mechanical refrigeration system diagram f) Explain the benefits of superheat and sub cooling g) Describe heat sink methods h) Describe heat exchange techniques i) Explain saturation temperature j) Identify different types of evaporators k) Identify different types of compressors l) Identify different types of metering devices m) Identify different types of condensers n) Identify refrigeration system accessories	
2	**Thermal Dynamics, Heat and Pressure:** a) Define matter and heat b) Distinguish between the three states of matter c) Explain the direction and rate of heat flow d) Describe the three methods of heat transfer e) Identify the reference points of temperature: boiling point, freezing point, critical temperature, absolute zero f) Explain the difference between heat and temperature g) Explain the difference between latent and sensible heat h) Explain the relationship of pressures and fluids at different temperatures i) Calculate absolute and gauge pressures j) Compare temperature with pressure (T/P chart) k) Explain why fluids flow	
3	**Refrigerants:** a) Define the properties of refrigerants b) Explain the uses of different refrigerants c) Identify color coding of refrigerant cylinders d) Explain classifications of refrigerants	

	e) List proper transfer and storage of refrigerants f) Identify the effects of improper refrigerant in a system	
4	**Equipment Installation and Materials:** a) Identify fasteners: bolts, screws, masonry anchors, various electrical connectors, conduit, pipe and cable clamps, nails, etc... b) Identify types of pipe and tubing used in refrigeration work c) Identify various types of fittings d) Describe methods of insulating pipe and tubing e) Identify soldering and brazing alloys used in HVACR f) Explain applications of soldering and brazing alloys g) Flare copper tubing h) Swage copper tubing i) Bend copper tubing j) Identify types of torches	
5	**Tools and Instrumentation:** a) Measure absolute and gauge pressures a) Identify basic tools and accessories: various screwdrivers, nutdrivers, socket wrenches, Allen wrenches, open end and box end wrenches, flare wrenches, etc.. b) Identify power tools: various drills, reciprocating saw, circular saw, portable band saw, jig saw, etc... c) Identify pipe and tubing tools: pipe cutters, tubing cutters, reamers, threaders, benders, flaring tools, swaging tools, pipe vises, etc... d) Describe lubrication methods utilizing grease guns, oilers and sprays e) Measure pressures with a refrigeration gauge manifold f) Evacuate a system with a two stage vacuum pump g) Measure vacuums with an electronic vacuum gauge h) Measure temperatures with various thermometers i) Solder and braze copper piping / tubing j) Cut, ream and thread black iron pipe	
6	**System Operation, Service and Maintenance:** a) Practice / observe safety practices & techniques b) Charge a system with refrigerant using an electronic charging scale c) Charge a system with refrigerant on the liquid side as well as the suction side d) Check for refrigerant leaks using various methods e) Repair refrigerant leaks f) Test and adjust all operating and safety controls g) Replace liquid line filter driers h) Inspect electrical circuit for defective connections and make repairs if needed i) Interpret electrical wiring diagrams j) Clean out condensate drain lines k) Check voltage supply and amp draw of all electrical components	

	l) Clean a condenser coil (air & water) m) Clean an evaporator coil n) Perform all aspects of preventive HVACR maintenance	

Connections:
*Secretary's Commission on Achieving Necessary Skills (SCANS)
*National Center for Construction Education Research (NCCER)
*21st Century Skills
*Common Core State Standards ELA and Math
*Interdisciplinary Course

Residential Energy Auditor Prep

460804

Course Description		
This course will provide step by step instruction and best practices involved in performing a residential energy audit. Ethics and customer relations, energy consumption and quality control inspecting. Building shell diagnosing, shell leakage, evaluating heating systems. Evaluation base load measures, windows, doors, and exterior insulation evaluations. Mobile homes and health and safety issues are also covered.		
Permission of the Instructor		
Content/Process		
1	**Safety & Health:** a) Students will receive safety training applied to energy auditing b) Discuss safety considerations for air leakage c) Discuss combustion safety d) Evaluate chimneys and liners and safety e) Discuss and evaluate health and safety issues pollutant sources and Co f) Inform students about lead - safe weatherization g) Practice electrical safety	
2	**Energy Auditor Prep:** a) Discuss the purpose of an energy audit b) Explore the energy auditing process, visual inspection/ diagnostics testing/ numerical analysis c) Examine differences of work inspections/ in progress inspections/ final inspections/quality assurance/energy auditing gas and ethics d) Students will practice evaluating attic and roof insulation/ story and a half homes and closed roof cavities e) Students will practice evaluating walk-up stair ways and doors/ retractable attic stairways f) Students will perform evaluation of wall insulation	
3	**Ethics and Consumer Relations:** a) Students will practice customer relations/ communication skill/customer interview/ best sales practices b) Students will practice customer education/ reducing heating consumption/ hot water and laundry/ cooling consumption c) Students will receive instruction on using Infrared and thermal scanning	
4	**Building Shell Diagnosing and Shell Leakage:** a) Discuss safety considerations for air leakage b) Students will observe and learn about air leakage problems and	

	solutions c) Discuss goals of air leak testing/ use of blower door d) Discuss and practice air sealing approaches e) Discuss crawl space moisture control f) Evaluate moisture problems and mold g) Perform evaluation of shell leakage	
5	**Evaluate Heating & Air Condition Systems:** a) Evaluate heating system replacement b) Perform inspection of gas and oil furnaces c) Discuss wood stoves safety and venting d) Test draft and venting of combustion air e) Practice leak testing gas piping f) Perform co carbon monoxide testing pap g) Discuss ways of improving inadequate draft h) Evaluate duct air distribution i) Practice evaluating duct leakage j) Discuss duct insulation and type k) Discuss instructions and installation of programmable thermostats l) Perform electric heating inspections m) Perform heat pump inspections n) Practice evaluating central air conditioning system o) Check duct leakage and air flow p) Review ASHRAE 6.2.2-2007 ventilation standards q) Evaluate whole house ventilation systems	
6	**Evaluate Water Heaters:** a) Complete water heater inspection gas/ electric/ thankless/solar b) Evaluate water heater energy savings	
7	**Evaluation Base Load measures, Windows, doors, and Exterior Insulation:** a) Students will be instructed on understanding energy usage/ base load usage/seasonal usage/ energy index/electrical peak load/carbon foot print b) Student will identify thermal bounding decisions/ determining floor and foundation insulation c) Discuss combustion safety d) Evaluate chimneys and liners and safety e) Practice air conditioning equipment sizing f) Discuss lighting improvements g) Explore different window shading/ treatments interior and exterior h) Observe and discuss landscaping for shade i) Discuss exterior storm windows j) Evaluate window replacement and weather striping k) Evaluate window replacement and weather striping l) Evaluate moisture problems and mold m) Practice evaluating belly and side wall insulation n) Discuss evaluation of windows and doors/replacement	

8	**Mobile Homes:** a) Evaluate moisture problems and mold b) Discuss crawl space moisture control c) Explore mobile home general auditing task d) Practice evaluating mobile home insulation e) Practice evaluating belly and side wall insulation f) Perform evaluation of shell leakage g) Discuss evaluation of windows and doors/replacement	

Connections:
*Common Core State Standards
*Kentucky Occupational Skills Standards Assessment
*Common Core Technical Standards
*New Generation Science Standards
*Post-Secondary KCTCS ACR280
*CTSO's—Skills USA

Residential HVAC Maintenance

460818

Course Description		
This course covers the basic aspects of maintaining various heating, ventilating, and air conditioning systems in residential buildings.		
Content/Process		
1	**Residential HVAC Maintenance:** a) Use safe HVAC procedures b) Explain the basic operation of furnaces c) Inspect a ventilation system d) Light and adjust a pilot light e) Adjust burners f) Inspect heat exchangers g) Adjust belts and pulleys h) Service fan motors i) Check air circulation around units j) Replace air filters k) Clean condensing and/or cooling coils l) Inspect flues m) Install thermostats n) Inspect and clean condensate lines o) Replace a thermocouple p) Install window air conditioning units	
Connections: *Common Core State Standards *KOSSA *Common Core Technical Standards *New Generation Science Standards CTSO's – Skills USA		

Residential Interior Maintenance

460222

Course Description
This course covers the basic aspects of drywall hanging, finishing, and repair; painting; window, door, and floor moldings; laying composition and vinyl flooring; and maintaining ceramic tile.

Content/Process		
	Residential Interior Maintenance: a) Safely perform drywall practices b) Use drywall hammers, knives, saws, and sanders c) Measure, cut, and hang drywall d) Repair/replace cornerbead e) Mix and prepare joint compound f) Finish drywall joints g) Mix texturing compound h) Apply texture to ceilings i) Repair/replace damaged drywall j) Clean and maintain drywall tools k) Estimate drywall materials l) Practice painting safety m) Select and use a variety of paints n) Prepare an area for painting o) Prepare surfaces for painting p) Caulk cracks and moldings q) Cut-in corners and trim with brushes r) Apply coatings with rollers and brushes s) Clean and maintain painting tools t) Estimate materials for painting u) Repair damaged wallpaper v) Use floor covering tools w) Install underlayment x) Repair/replace composition floor tiles y) Repair/replace vinyl flooring z) Estimate materials for floor coverings aa) Regrout and caulk ceramic tiles	

Connections:
*Common Core State Standards
*KOSSA
*Common Core Technical Standards
*New Generation Science Standards
*Post-Secondary: KCTCS ACR280
CTSO's – Skills USA

Residential Maintenance Carpentry

460220

Course Description
This course covers the basic aspects of framing, roofing, window, door, and stair maintenance. The student will receive training in the proper use of ladders and in the handling and storage of building materials.

Content/Process		
	Residential Maintenance Carpentry: a) Demonstrate safe carpentry practices b) Construct and/or install a partition wall c) Frame wall openings d) Install/repair roof flashing e) Install rolled roofing f) Install/replace composition shingles g) Weatherproof exterior siding h) Install/repair doors i) Install/repair door hardware j) Install/repair windows k) Construct concrete forms l) Install insulation m) Maintain gutters and downspouts n) Reglaze a window sash o) Install/repair a window screen p) Knowledge of building and trade codes q) Safely and properly handle and store materials r) Calculate material costs s) Knowledge of ordering and reviewing materials	

Connections:
*Common Core State Standards
*KOSSA
*Common Core Technical Standards
*New Generation Science Standards
CTSO's – Skills USA

Residential Maintenance Masonry

460114

Course Description		
This course covers the basic aspects of masonry as it relates to the residential structure. Emphasis is placed on proper handling, mixing, placing, and finishing of Portland cement products.		
Content/Process		
1	**Residential Maintenance Masonry:** a) Practice safe masonry procedures b) Use masonry trowels, hammers, and chisels c) Proportion and mix concrete d) Install concrete e) Edge, joint, and finish concrete f) Measure and mix mortar with a hoe and mortar box g) Repair/replace bricks h) Repair/replace concrete blocks i) Tuckpoint walls j) Cut masonry materials with hand tools k) Cut masonry materials with a circular saw l) Clean and maintain masonry tools m) Estimate masonry materials n) Store masonry tools, materials, and equipment	
Connections: *Common Core State Standards *KOSSA *Common Core Technical Standards *New Generation Science Standards CTSO's – Skills USA		

Residential Maintenance Plumbing

460516

Course Description
This course covers the basic aspects of clearing blocked drains, repairing leaks, repair and replacement of residential plumbing fixtures, and working with copper, plastic, and steel pipes.

Content/Process		
	Residential Maintenance Plumbing: a) Practice safe plumbing procedures b) Identify plumbing systems components c) Use plumber's cutting, cleaning, and joining tools d) Remove obstructions from building drains e) Repair malfunctioning valves and faucets f) Measure, cut, ream, and join copper pipe g) Cut and join plastic pipe h) Bend copper pipe using spring benders i) Join steel pipe j) Join pipes of different types k) Secure pipes l) Repair/replace the water supply line for a plumbing fixture m) Repair leaks in pipes n) Insulate water pipes o) Repair/replace water closets p) Repair/replace lavatories q) Repair/replace kitchen sinks r) Test gas piping for leaks s) Maintain plumbing tools t) Estimate plumbing materials and supplies	

Connections:
*Common Core State Standards
*KOSSA
*Common Core Technical Standards
*New Generation Science Standards
CTSO's – Skills USA

Residential Maintenance Wiring

460333

Course Description
This course covers the basic aspects of electric theory, wire and cables, fixtures and devices, and troubleshooting and maintenance wiring.

Content/Process

Residential Maintenance Wiring:

a) Practice safe electrical procedures
b) Use electrician's cutting, stripping, and connecting tools
c) Demonstrate knowledge of electrical theory
d) Use electrical test equipment
e) Route, pull, and secure cables
f) Remove cable sheathing
g) Make electrical connections
h) Remove/replace device boxes
i) Remove/replace circuit breakers and fuses
j) Identify and mark circuits in a service panel
k) Check overloaded circuits
l) Remove/replace lighting fixtures
m) Remove/replace receptacles
n) Remove/replace switches (SP, 3W)
o) Troubleshoot/repair lighting and receptacle circuits
p) Repair doorbell/chime system
q) Remove/replace photo electric control
r) Remove/replace phone outlets
s) Maintain electrical tools
t) Estimate electrical materials

Connections:
*Common Core State Standards
*KOSSA
*Common Core Technical Standards
*New Generation Science Standards
CTSO's – Skills USA

Sheet Metal Fabrication

460847

Course Description		
The student will learn to make patterns and lay out and construct common sheet metal duct fittings.		
Content/Process		
1	**Sheet Metal Fabrication:** a) Lay out and construct common sheet metal duct fittings b) Construct duct connectors of all shapes and sizes c) Construct duct couplings of all shapes and sizes d) Construct three-way and four-way duct fittings of various sizes e) Lay out a duct system for a residence or commercial building f) Install duct system in a residence or commercial building	
Connections: *Common Core State Standards *Kentucky Occupational Skills Standards Assessment *Common Core Technical Standards *New Generation Science Standards *Post-Secondary KCTCS ACR112 *CTSO's—Skills USA		